

A SYNOPSIS OF THE GENUS *OTOSTYLIS*  
(ORCHIDACEAE: MAXILLARIEAE SUBTRIBE  
ZYGOPETALINAE) WITH A NEW RECORD  
FROM SOUTHERN PERU

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ABSTRACT

The genus *Otostylis* (Orchidaceae) is one of the lesser known genera in the *Zygopetalum* alliance, which has had a problematic taxonomic history. *Otostylis* consists of four species distributed in South America and Trinidad. The purpose of this paper is to provide a synopsis of the genus, with descriptions of the four species and keys for their identification. *Otostylis paludosa* is resurrected from previous synonymy under *O. lepida* and reported as a new record for the genus in Peru, occurring as a dominant herb in bog wetlands of the Department of Madre de Dios.

RESUMEN

El género *Otostylis* (Orchidaceae) es uno de los géneros poco conocidos en la alianza de *Zygopetalum*, que ha tenido una historia taxonómica problemática. *Otostylis* consiste en cuatro especies distribuidas en América del sur y Trinidad. El objetivo de este artículo es proveer de una sinopsis del género, con descripciones de las cuatro especies y claves para su identificación. *Otostylis paludosa* dejó de ser sinónimo de *O. lepida* y está reportado como un nuevo registro para el Perú, siendo una hierba dominante en los pantanos del Departamento de Madre de Dios.

INTRODUCTION

The circumscription of orchid genera related to *Zygopetalum* W.J. Hook. has been problematic throughout the history of botany, and periodically all taxa have been united within an impossibly broadly defined *Zygopetalum*. Our modern understanding of generic limits in the group begins with a generally accepted review by Garay (1973). Subsequent authors have dealt with nomenclatural problems (Christenson 1988), generic reviews (Christenson 2002), and the confounding generic issues of taxa lacking pseudobulbs (Dressler 2000).

One of the lesser-known genera in the *Zygopetalum* alliance is *Otostylis*

Schltr. It was described by the German orchidologist Rudolf Schlechter in 1918 in a review of genera previously combined with *Aganisia* Lindl. The name is derived from the Greek *otos*, meaning ear, and *stylis*, meaning column, referring to the conspicuous subapical wings on the column. This character separates it from related genera including *Aganisia*, *Warreella* Schltr., and *Warreopsis* Garay. *Otostylis* has been generally accepted in floristic accounts since its original publication. Rather astonishingly, despite their showy flowers, plants of *Otostylis* have been rarely cultivated in modern times and are only now being reintroduced to horticulture.

The purpose of this note is to provide a synopsis of *Otostylis* and report the discovery of the genus for the first time in southern Peru. Recent collecting of vouchers for botanical and ecological studies in Madre de Dios, Peru, under the auspices of the Botanical Research Institute of Texas (BRIT) and the San Marcos Herbarium (USM) has revealed a substantial population of *O. paludosa* (Cogn.) Schltr., a previously endemic Brazilian taxon incorrectly reduced to synonymy in recent times.

#### TAXONOMY

***Otostylis* Schltr.**, *Orchis* 12:38. 1918. TYPE: *Otostylis lepida* (Linden & Rehb.f.) Schltr.

Caespitose terrestrials. Pseudobulbs ovoid, small, typically concealed by bracts and leaf bases. Leaves several, plicate, lanceolate, petiolate, acuminate, sometimes with subsimilar foliaceous bracts subtending the pseudobulbs. Inflorescences axillary erect long-pedunculate racemes, the floral bracts inconspicuous. Flowers numerous, several open at once, showy, long-lasting, predominately white, crystalline in texture. Sepals and petals subsimilar, subequal, free, spreading. Lip unlobed or obscurely three-lobed, subauriculate, with a basal transverse crested callus, sometimes biseriate. Column straight, conspicuously winged, with a short foot; pollinia 4, on a common linear viscidium.

*Otostylis* comprises four superficially similar species native to South America and Trinidad.

#### KEY TO THE SPECIES

1. Callus minutely warty, W-shaped with two short continuous arms extending onto the blade of the lip \_\_\_\_\_ ***O. lepida***
1. Callus not warty, entire or biseriate without continuous extensions.
  2. Callus biseriate comprising a transverse ridge with three low parallel keels in front \_\_\_\_\_ ***O. brachystalix***
  2. Callus entire, a high crest.
    3. Callus toothed, inflorescences less than 50 cm tall (northern South America) \_\_\_\_\_ ***O. alba***
    3. Callus ridged but not forming distinct teeth, inflorescences commonly 1 m tall (southern Brazil and Peru) \_\_\_\_\_ ***O. paludosa***

**1. *Otostylis alba* (Ridl.) Summerhayes**, *Kew Bull.* 6:293. 1951. *Aganisia alba* Ridl.,

Timehri 5204. 1886; *Zygopetalum venustum* Ridl., Trans. Linn. Soc. Bot., ser. 2, 2:283, t. 47. 1887; *Aganisia venusta* (Ridl.) Rolfe ex J.D. Hooker, Bot. Mag. 118: sub t. 7270. 1892; *Warreella venusta* (Ridl.) Schltr., Die Orchideen, ed. 1:425. 1914; *Koellensteinia alba* (Ridl.) Schltr., Orchis 9:32. 1915; *Otostylis venusta* (Ridl.) Schltr., Orchis 12:41. 1918. TYPE: VENEZUELA: Bolivar, Mt. Roraima district, along the Kookenam River, 1000 m, E.F. Im Thurn 360 (HOLOTYPE: BM; ISOTYPE: K).

Pseudobulbs ovoid, to 1.5 cm long, ca. 1 cm wide and 0.5 cm thick, completely concealed by the leaf bases, apically unifoliate. Leaves 3–4, arching, linear-lanceolate, petiolate, acuminate, to 25 × 2 cm. Inflorescences erect long-pedunculate racemes to 40 cm long, longer than the arching leaves, the floral bracts triangular-ovate, acute, to 0.6 cm long. Flowers 10–12, to 2.5 cm across, white, the callus and surrounding field yellow. Sepals and petals subsimilar, subequal, elliptic, obtuse, the dorsal sepal to 1.3 × 0.8 cm, the lateral sepals to 1.5 × 1 cm, the petals to 1.2 × 0.7 cm. Lip unlobed, elliptic, obtuse, minutely emarginate, to 1.3 × 1.3 cm, the callus a high transverse semicircular crest divided into blunt teeth, ca. 7 mm wide. Column winged, to 1 cm long, width at wings 7 mm wide, width at base 2.5 mm wide, the wings obliquely ovate. Fruits not seen.

*Distribution*.—Venezuela, the Guianas, and Brazil at elevations around 1000 m (Foldats 1970).

Some authors reduce this species to the synonymy of *O. lepida* (e.g., Dunsterville & Garay 1965; Pabst & Dungs 1977; Senghas & Gerlach 1996; Romero-González 2003) but we are following Foldats (1970) in keeping it separate. *Otostylis lepida* has been recorded from the Brazilian states of Amazonas, Matto Grosso and Para (Pabst & Dungs 1977). The records for Amazonas are likely correct; the records for Matto Grosso are based on the previous inclusion of *O. paludosa* in synonymy; and the records for Para require reexamination of those vouchers, outside the scope of this paper.

**2. *Otostylis brachystalix*** (Rchb.f.) Schltr., Orchis 12:39. 1918. (Figs. 1, 2). *Zygopetalum brachystalix* Rchb.f., Ann. Bot. Syst. 6:660. 1863; *Aganisia brachystalix* (Rchb.f.) Rolfe, Orchid Rev. 22:200. 1914; *Koellensteinia brachystalix* (Rchb.f.) Schltr., Orchis 9:31. 1915. TYPE: TRINIDAD: leg. ignot. s.n. (HOLOTYPE: W, drawing seen).

Pseudobulbs short, ovoid, to 2 cm long, completely concealed by the leaf bases. Leaves 3–4, erect, grass-like, acuminate, to 70 × 2 cm, often half that size. Inflorescences erect long-pedunculate racemes to 70 cm long, longer than the leaves, the floral bracts inconspicuous, ovate, acute, 6 mm long. Flowers 5–30, to 2.5 cm across, sepals and petals white, the lip white with a yellow center. Sepals elliptic, obtuse, to 1.8 × 1.2 cm. Petals obovate, obtuse, to 1.7 × 1 cm. Lip obscurely three-lobed, to 1.2 × 1.2 cm, the lateral lobes small, subauriculate, flanking the callus, the midlobe transversely kidney-shaped, obtuse, the callus a low transverse ridge across the lateral lip lobes in a raised crescent that diminishes to the sides of the lobes. Column stout with conspicuous rhombic subapical wings, to 0.8 cm long, 6 mm wide across the wings, 2.5 mm wide at the base. Fruits capsules, ellipsoid, smooth.



FIG. 1. Habit of *Otostylis brachystalix* from the Aripo Savannah wetland of Trinidad-Tobago. (Photograph by Julian Kenny, Trinidad-Tobago, 2003)



FIG. 2. Inflorescence and flowers of *Otostylis brachystalix* from Trinidad-Tobago. (Photograph by Julian Kenny, Trinidad-Tobago, 2003)

*Distribution*.—Trinidad, Colombia (Ortiz 1995), Venezuela, the Guianas, Brazil, and Peru (Loreto) at elevations of 150–1675 m.

Much early confusion surrounding this species was resolved by Ames (1922) who provided the first illustration of *O. brachystalix* based on a plant from Trinidad, where it was collected for the first time in the Aripo Savannah. Described by Reichenbach in 1861 as *Zygotetulum brachystalix*, this species is characterized by having a weakly three-lobed lip and a biseriate callus consisting of a low transverse ridge between the auriculate lip lobules supplemented by three small longitudinal keels in front. Figures 1 and 2 provide images of the habit, inflorescence, and flowers of *O. brachystalix*, courtesy of Dr. Julian Kenny. Pabst and Dungs (1977: 285) provided an illustration of a flower dissection of *O. brachystalix*.

According to Julian Kenny (2004, pers. comm.), *O. brachystalix* is known in eastern Trinidad from the Aripo Savannah, which is a 360-hectare bog-like grassland lying on a bed of quartz sand over a clay pan. The savannah is boggy during the rainy season and arid during the dry season. The dominant vegetation consists of grasses and sedges, as well as bog indicators, *Drosera* and *Sphagnum* species.

In the Aripo Savannah, *O. brachystalix* is more often seen on well-drained, slightly elevated patches. It flowers typically in the dry season from January to April (Kenny 1988). A mature plant grows to about 70 cm tall. Populations have declined significantly in the last 20 years (Kenny 2004, pers. comm.), presumably due to overcollecting, as it is the easiest to grow of the savannah orchids. A pot of sand and exposure to sun and proper watering is all that is necessary to cultivate this species (Kenny 2004, pers. comm.). Several other orchids exist in this habitat, such as *Cleistes tenuis* (Rchbf.) Schltr., *Epistephium parviflorum* Lindl., *Habenaria lepricurii* Rchbf., *H. mesodactyla* Griseb., and *Sarcoglottis simplex* (Griseb.) Schltr. *Cyrtopodium parviflorum* Lindl. also exists in the same habitat but according to Kenny (2004, pers. comm.) it is now rare due to overcollecting.

**3. *Otostylis lepida*** (Linden and Rchbf.) Schltr., *Orchis* 12:40. 1918. *Aganisia lepida* Linden and Rchbf., *Beitr. Orchideenkunde* 15, t. 5. 1869. TYPE: BRAZIL. AMAZONAS. Rio Negro, *C. Wallis* s.n. (HOLOTYPE: W!).

Pseudobulbs slender, fusiform, to 6 cm long, to 1 cm in diameter, subtended by nonfoliaceous bracts. Leaves 1–3, arching-erect, linear-lanceolate, petiolate, acuminate, to 65 × 6 cm, often half that size. Inflorescences erect long-pedunculate racemes, shorter than the leaves, to 25 cm long, the floral bracts inconspicuous, ovate, acute, to 0.4 cm long. Flowers 4–10, 2 mm across, white, the sepals and petals often suffused with pink toward the apices, the callus and surrounding field yellow. Sepals and petals subsimilar, elliptic, acute, the sepals to 2 × 1 cm, the petals to 1.8 × 0.8 cm. Lip unlobed, elliptic-suborbicular, slightly constricted above the base (= obscurely pandurate), obtuse-truncate with a minutely apiculate apex formed by conduplicate folding, to 1.8 × 1.8 cm,



FIG. 3. Habit of *Otostylis paludosa* in a palm swamp of Madre de Dios, Peru, showing the erect leaves and elongated inflorescence of this species. (Photograph by John Janovec, 2002)





FIG. 4. Inflorescence and flowers of *Otostylis paludosa* from Madre de Dios, Peru. (Photograph by Mathias Tobler, 2002)





FIG. 5. Palm swamp habitat of *Otostylis paludosa* in Madre de Dios, Peru. (Photograph by Mathias Tobler, 2002)

the callus loosely W-shaped, a transverse minutely warty ridge extending as two short arms. Column winged, to 1.2 cm long, 7 mm wide across the wings, 3 mm wide at the base, the wings quadrate, truncate. Fruits not seen.

*Distribution*.—Venezuela, Guiana, and Brazil at elevations of 750–1615 m.

This species is easily recognized by its minutely warty callus with arms that extend onto the blade of the lip.

**4. *Otostylis paludosa* (Cogn.) Schltr., Repert. Spec. Nov. Regni Veg. 15:214. 1918.**

(Figs. 3–5). *Zygotetulum paludosum* Cogniaux, Comm. Linh. Tel. Est. Matto Grosso, Annex. 5, pt. 312, t. 64. 1912. TYPE BRAZIL. MATTO GROSSO: Rio Juruena, May, F.C. Hoehne (Comm. Rondon) 2000 & 2013 (SYNTYPE BR!).

Pseudobulbs ovoid, to 2 cm long, completely concealed by leaf bases. Leaves 1–2, erect, linear-lanceolate, petiolate, acuminate, to 60.7 cm long, 2.3 cm wide. Inflorescences erect long-pedunculate racemes, longer than the leaves, the peduncle to 62.4 cm long, the rachis 10–15 cm long, the floral bracts lanceolate, acute, to 0.5 cm long. Flowers 10–20, to 3 cm across, white, the center of the lip yellow, the inner face of the column purple. Sepals and petals subsimilar, subequal, spreading, oblong-elliptic, obtuse, the dorsal sepal to 17 × 7 mm, the lateral sepals to 15 × 8 mm, the petals to 15 × 6 mm. Lip unlobed auriculate, the midlobe suborbicular to transversely kidney-shaped, broadly rounded, to 12 × 11 mm, the callus a transverse, lunate crest, incised forming ridges but not distinct teeth, to 2.5 mm long and 5 mm wide. Column stout, to 8 mm long, with obtuse, quadrangular wings, to 4 × 1.9 mm, the width at wings to 7 mm and at base to 3.5 mm. Fruits ellipsoid, smooth capsules.

*Distribution*.—Brazil (Matto Grosso) and Madre de Dios, Peru, in the hot, humid lowlands at ca. 230–250 m.

This somewhat obscure species, generally maintained in the synonymy of *O. lepida* (e.g., Pabst & Dungs 1977), has rather ironically been well illustrated in the literature. In particular, the drawing from *Flora Brasílica* (Hoehne 1948, 1953) was reproduced in the very widely available horticultural manual *Encyclopaedia of Cultivated Orchids* (Hawkes 1965: 348). In addition, a watercolor drawing of a flower, clearly showing the high callus without ancillary structures in front, was reproduced in Pabst and Dungs (1977: 229, as *O. lepida*).

A swamp dweller as the name implies, plants of *O. paludosa* are remarkable for their stature when in flower, being about twice as tall as the other species in the genus (Fig. 3). The flowers, however, are similar in size to other species of *Otostylis*. A photograph of a flowering plant *in situ* on the Parecis plateau and its habitat was given by Miranda (1996) as *O. lepida* but is probably *O. paludosa*. See Figure 4 for images of the inflorescence and flowers of *O. paludosa* from Madre de Dios, Peru.

We record this species as new to the flora of Peru based on a collection by Janovec et al. from the Department of Madre de Dios. It has only been found in bog-like savannah habitat associated with large swamps dominated by the palm

*Mauritia flexuosa* L. (Arecaceae), known commonly as the Aguaje palm. Figure 5 shows the habitat of *O. paludosa* from a study site in Madre de Dios, Peru.

*Otostylis paludosa* is the largest, most abundant, and conspicuous orchid growing in the open boggy savannahs of the Aguaje palm swamp habitat in the region. This species grows with ferns, grasses, rushes, sedges, and other plants on small moist raised areas of *Sphagnum* emerging like small islands from the bog water. Botanical and ecological studies in progress have documented hundreds of individuals of this species per hectare (Janovec et al., in prep.). Despite its abundance, this species has never been recorded in Peru, most likely due to a major lack of exploration of vast wetland habitats, especially of Madre de Dios, Peru.

The peak flowering season in Peru is July–September, when the white flowering inflorescences of this species can be observed in abundance, but flowers have also been observed in January–March. The plants can be seen holding fruits during March–July and September–February.

Collections examined: **PERU. Madre de Dios:** Manu Province, *Mauritia flexuosa* (Arecaceae) palm swamp 7 km up the Madre de Dios River from the Los Amigos River, 230 m, 19 Aug 2002, J.P. Janovec et al. 2662 (USM, BRIT); same locality. M.A. Chocce 277, 279, & 295 (USM).

#### EXCLUDED SPECIES

*Otostylis hirtzii* Dodson, Icon. Pl. Trop., ser. 1, t. 976. 1984. TYPE: ECUADOR: Pichincha, between San Juan and Chiriboga on old road from Quito to Santo Domingo, 1800–2200 m, 7 Mar 1982, A. Hirtz & J. Leon 201 (HOLOTYPE: SEL) = *Warreopsis pardina* (Rchb.f.) Garay (see Senghas & Gerlach 1993).

Stems short, completely concealed by leaf bases. Leaves 3–5, lanceolate, long-petiolate, acuminate, to 75 × 8 cm. Inflorescences erect long-pedunculate racemes to 75 cm long, the floral bracts lanceolate, acute, to 0.5 cm long. Flowers 12–15, to 1.7 cm across, the sepals and petals yellow with purple spots, the lip pinkish-white. Sepals and petals subsimilar, subequal, oblong-elliptic, obtuse, to 1 × 0.5 cm, the dorsal sepal concave. Lip unlobed, auriculate, fan-shaped, notched at the apex, to 0.8 × 0.9 cm, the callus an inverted U-shaped crest. Column straight, without wings, to 0.6 cm long, the foot to 0.2 cm long. Fruits not seen.

*Distribution.*—Known from Colombia and Ecuador at elevations of 1800–2200 m.

This species has always been out of place in *Otostylis* by virtue of its column which is devoid of any wings and its boldly spotted yellow sepals and petals. With the removal of this species to *Warreopsis*, all species of *Otostylis* have the generic character of prominent column wings as well as unmarked white sepals and petals.

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